NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

1. Solve the system, $\begin{matrix} x - 2y = 1 \\ x + 4y = 8 \end{matrix}$ using matrices.

$$\begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 8 \end{bmatrix}$$

determinant

$4-(-2)=6$

Inverse

$$\frac{1}{6} \cdot \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix} = \begin{bmatrix} \frac{2}{3} & \frac{1}{3} \\ -\frac{1}{6} & \frac{1}{6} \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \frac{2}{3} & \frac{1}{3} \\ -\frac{1}{6} & \frac{1}{6} \end{bmatrix} \cdot \begin{bmatrix} 1 \\ 8 \end{bmatrix} = \begin{bmatrix} \frac{10}{3} \\ \frac{7}{6} \end{bmatrix}$$

$x = \frac{10}{3}$ $y = \frac{7}{6}$

Check: $\frac{10}{3} - 2\left(\frac{7}{6}\right) = 1$ ✓

$\frac{10}{3} + 4\left(\frac{7}{6}\right) = 8$ ✓

In Exercise 5, you explained why matrices with a determinant of 0 has no inverse. Find the determinant of each matrix and then decide which have no inverse.

2. $\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$ $4-6=-2$

3. $\begin{bmatrix} 2 & -1 \\ 4 & 0 \end{bmatrix}$ $0-(-4)=4$

4. $\begin{bmatrix} 2 & -2 \\ -1 & 1 \end{bmatrix}$ $2-(2)=0$ No Inverse

5. $\begin{bmatrix} 5 & 2 \\ -10 & 4 \end{bmatrix}$ $20-(-20)=40$

6. Julie went to the Taco Truck and bought 5 tacos and 2 burritos for $12.50. Kent bought 3 tacos and 4 burritos for $14.50. Use matrices to determine how much each taco costs.

T= Cost of Taco

B= Cost of Burrito

$5T+2B=\$12.50$
$3T+4B=\$14.50$

$$\begin{bmatrix}5 & 2\\ 3 & 4\end{bmatrix}\cdot\begin{bmatrix}T\\ B\end{bmatrix}=\begin{bmatrix}12.50\\ 14.50\end{bmatrix}$$

determinant
$20-6=14$

Inverse: $\frac{1}{14}\begin{bmatrix}4 & -2\\ -3 & 5\end{bmatrix}=\begin{bmatrix}\frac{2}{7} & -\frac{1}{7}\\ -\frac{3}{14} & \frac{5}{14}\end{bmatrix}$

$$\begin{bmatrix}T\\ B\end{bmatrix}=\begin{bmatrix}\frac{2}{7} & -\frac{1}{7}\\ -\frac{3}{14} & \frac{5}{14}\end{bmatrix}\cdot\begin{bmatrix}12.50\\ 14.50\end{bmatrix}=\begin{bmatrix}1.50\\ 2.50\end{bmatrix}$$

Tacos $1.50
Burritos $2.50

Check:

$5(1.50)+2(2.50)=\$12.50$
$3(1.50)+4(2.50)=\$14.50$